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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,877	06/29/2001	Wendell P. Noble	MI22-1757	3354
21567	7590	05/20/2004	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			GURLEY, LYNNE ANN	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicant(s)

09/896,877

Applicant(s)

NOBLE, WENDELL P.

Examiner

Lynne A. Gurley

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 5-9 and 40-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5-9 and 40-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/15/03</u> | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This Office Action is in response to the amendment filed 12/15/03.

Currently, claims 5-9 and 40-53 are pending.

#### *Specification*

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 5-9, 40-49 and 51-53 are rejected under 35 U.S.C. 102(e) as being anticipated by Hsiao (US 6,291,286, dated 9/18/01, filed 11/27/98).

Hsiao shows the method as claimed in figures 2-6 and corresponding text, with diffusion region or conductive node 55/56, conductive line 54, interconnect 58. In figures 2 and 5, the dielectric 52 is etched back in order to make room for the conductor 58, which connects 54 to the diffusion region or conductive node. See figure 6 for the final structure. Interconnecting the conductive line and the diffusion region or conductive

Art Unit: 2812

node comprises forming the electrically conductive material over both the conductive line and the diffusion region (figure 6). An isolation oxide region is formed laterally adjacent the semiconductive material and part of the isolation oxide is removed and replaced with conductive material (figures 2 and 5). The oxide is removed to a greater degree in an elevationally downward direction than a laterally outward direction. The node in part is a source/drain region 66. The electrically conductive material may be the same or different (doped polysilicon; column 4, lines 30-33). Insulating material or oxide is formed between the conductive line and the conductive node.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Art Unit: 2812

6. Claims 5-9 and 40-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al. (US 5,604,159, dated 2/19/97, filed 1/31/94) in view of Bothra (US 6,277,708, dated 8/21/01, filed 3/31/98).

Cooper shows the method substantially as claimed (Abstract and figures 1-24 and corresponding text). As explained in the abstract, the diffused/node regions may be formed first, then the isolation region is formed and subsequently a metal line with an interconnect to connect the diffusion/node region to the conductive line. Figure 14 shows that the conductive line (the part of 60 which is in the contact adjacent 34) is laterally spaced from the semiconductive material and diffusion/node region as well as elevationally spaced below the diffusion region/node outer surface. Then the anneal may take place to make the connection between the diffusion/node region and the conductive line with the interconnect 60 above the substrate. Part of the isolation region is removed in order to accommodate the conductive line.

Cooper lacks anticipation only in not teaching that the conductive line and the electrically conductive material comprises from refractory metals.

Bothra teaches an interconnect with a metal line in a trench isolation structure similar to that of Cooper, wherein part of the conductive structure is formed from a refractory metal.

It would have been obvious to one of ordinary skill in the art to have used a refractory metal in the conductive structure of Cooper, as suggested by the method in Bothra, with the motivation that the refractory metal would allow subsequent deposition and method procedures to be performed without concern for high temperature processes. Refractory metals have very high melting points and would tend to not be affected by subsequent processing steps and anneals.

Art Unit: 2812

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See Shin (US 6.136,701) for an interconnect process without the metal line being elevationally below the diffused region.

*Response to Arguments*

8. In response to Applicant's remarks, the prior art of record meets the limitations of the claim language.

*Conclusion*

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

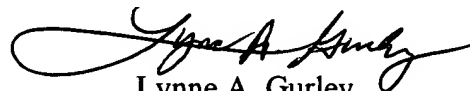
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

Art Unit: 2812

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Niebling John can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-308-0956.



Lynne A. Gurley  
Primary Patent Examiner  
TC 2800, AU 2812

LAG  
May 17, 2004